mates.* Professor Le Conte maintains not only that "the fovea is necessary to the concentration of the attention on the thing looked at," but also (p. 302) that "the existence" of the fovea is determined by "the habits of the animal, especially in looking attentively."

2. I regard it as either bad psychology or bad terminology to say: "We do, indeed, see all objects double except under certain conditions." We do not hear each of the overtones of a tone because most people can learn to distinguish them, nor do we know the motives of our actions because we believe that motives exist.

3. I am glad that Professor Le Conte here calls attention to the real psychological problems involved in localization in the field of vision and in the coordination of visual and motor perceptions. The section in his book which I criticised is, however, headed 'Erect Vision,' and he writes: "How, then, with inverted retinal images, do we see objects in their right position, *i. e., erect?* This question has puzzled thinkers for many centuries," etc. The question seems to me analogous to that of the child who asks how people in China with their heads down can hang on by their toes. It may be a popular paradox, but I do not admit that it is a question deserving serious scientific discussion.

J. McKeen Cattell.

A SIMPLE METHOD OF COMBINING THE COLORS.

The following very simple method of illustrating the recomposition of the spectral colors into white light has some obvious advantages in the way of ease of apprehension on the part of the beginning student. It also possesses an additional and not inconsiderable advantage in that it is striking.

A rectangular refraction tank with glass ends is set up in front of the lantern, both being preferably upon a rotating stand. From a horizontal slit a beam is projected and the prism interposed in such a manner that there is sent down into the water the rays of the spectrum, their order from red to violet running lengthwise of the tank. A few drops of milk are mixed with the water, and with care a mixture may be obtained which in a side view shows the separated rays clearly, while at the same time if viewed from the end of the tank it looks quite white. On cutting off either the violet or red end of the spectrum the end view becomes colored.

If a strong beam is available it is better to turn it back toward the lantern by a reflector before sending it through the prism. This brings the violet rays which are least intense nearest the end, where they have to traverse a thinner stratum of the mixture.

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* For the most recent work on the subject *cf* the thesis by Dr. Slonaker in the *Journal of Morphology* XIII., 3. Professor Le Conte himself in a later chapter refers to a more highly organized central area in the lower mammals.

SCIENTIFIC LITERATURE.

Report of Explorations in the Labrador Peninsula along the East Main, Koksoak, Hamilton, Manicuagan and the Portions of Other Rivers in 1892–93–94–95. By A. P. Low, B. Ap. Sc. Annual Report of Progress, Geological Survey of Canada, Vol. VIII., pp. 385.

One of the most interesting and valuable reports which has been issued by the Geological Survey of Canada in recent years has just appeared on the peninsula of Labrador, by Mr. A. P. Low.

The report embodies the results of four years' exploration, during which time Mr. Low has traversed Labrador from north to south and from east to west, and it presents in readable form a summary of our knowledge, not only of the geography and geology, but also of the climatology, botany, zoology and natural resources of this remotest part of the Dominion, the interior of which, prior to Mr. Low's exploration, was practically unknown. Mr. Low's work, the results of portions of which have been previously published in preliminary reports to the Geological Survey, and in papers presented to various scientific societies, has attracted much attention and has recently been accorded an especial recognition by the Royal Geographical Society of England. The report is accompanied by a fine map of Labrador, in four sheets, on a scale of 25 miles to the inch, which is colored geologically along the lines

of traverse, and it is illustrated by a number of views showing the character of the country, among them one of the Grand Falls of the Hamilton River, concerning which there was so much discussion a few years since.

The peninsula may be described as a high rolling plateau having a general elevation of from 1,600 to 1,800 feet, the surface sloping rapidly down towards the Atlantic and Gulf of St. Lawrence, but much more gently toward James Bay. To the north of Nain the high land of the coast rises in sharp unglaciated mountains to the height of from 2,500 to probably 6,000 feet.

One of the most remarkable physical features of the country are the deep cañons or fjords followed by all the rivers draining the interior where they cut through the margin of the peninsula and run out to sea. These have rock walls from 1,000 to 4,000 feet in height, while the river channels are from 10 to 100 fathoms deep. They appear to be valleys of deundation and are of very ancient origin, antedating the Cambrian, undisturbed horizontal beds of this age being found deposited upon their lower levels. The gorges of the Hamilton, Sandwich and Kaipokok might be cited as examples, as well as those of the Moisir and Saguenay, discharging into the Gulf of St. Lawrence.

About nine-tenths of Labrador is underlain by rocks of Laurentian age, and, like all the rest of the glaciated Laurentian country, the plateau is studded with myriads of lakes, great and small, which are estimated to occupy at least one-fourth of the total surface, and which are drained by a network of streams discharging into the deep fjords above referred to. The peninsula is underlain exclusively by the oldest rock systems of the earth's crust, the Laurentian, Huronian and Cambrian, besides certain rocks of intrusive origin. The Laurentian rocks differ in no essential particular from those found elsewhere in Canada. Both the Fundamental Gneiss and the Grenville Series are largely represented, the latter running in wide and persistent bands across the country and consisting of micaceous gneisses and schists, quartzites, crystalline limestone, etc., often holding graphite. Great anorthosite intrusions cut these rocks, and from certain of these intrusions is derived the precious labradorite.

The Huronian is represented by several widely separated areas of clastic and volcanic rocks, together with many basic eruptives. They consist of schists of various kinds, with conglomerates, breccias, diorites and other rocks. The Laurentian and Huronian are intensely folded, the folding having taken place at a time long prior to the deposition of the sedimentary beds of Cambrian Age, and a sufficiently long time had elapsed, as has been mentioned, between the period of folding and the Cambrian submergence to permit of enormous denudation and erosion.

The Cambrian strata, which rest uncomformably upon the Laurentian and Huronian, consist of bedded sandstones, argillites, shales and limestones, along with bedded traps and other volcanic rocks and enormous deposits of excellent iron ore, whose mode of occurrence is closely analogous to that of the iron ores of Michigan and Wisconsin.

The surface of the country is mantled with drift, and there is distinct evidence that the whole Labrador peninsula, except a narrow strip of very high land along the North Atlantic coast, was completely buried in ice during a portion at least of the glacial period. The movement of the ice was outward in all directions from a central gathering ground. The position of this névé field was about midway between the east and west coast of the peninsula and between latitudes 53° and 55°, and the area is now characterized by the presence of partially rounded boulders and angular blocks of rock scattered over hill and hollow. Most of these repose on rocks of the same petrographical character as themselves and have evidently been transported but very short distances from their original positions. They probably represent boulders of decomposition but slightly modified by subsequent ice action.

The various sorts of drift and the forms assumed by the drift are described, although a detailed study of these was impossible, owing to the dense forest growth which covers the greater part of the area. There is distinct evidence of a past glacial uplift, which, however, it is believed was not equal all around the coast,

being about three times as great on the south and west margins as along the north and east coast, where two hundred feet appear to be the limit of raised marine terraces and beaches. Appended to the report are lists of the mammalia, birds, food fishes and plants found in Labrador, as well as an appendix by Mr. Ferrier on the microscopical structure of some of the rocks collected, and one by Mr. Eaton on the meteorology of the peninsula.

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L' Evolution de commerce dans les diverses races humaines. Par Ch. Letourneau, Professeur à L' École d' Anthropologie. Paris, Vigot Freres. 1897. Pp. 581.

Professor Letourneau has made it his special branch to write about the development of arts and institutions. In the volume before us he takes up commerce, and aims to show its beginning and its growth in the various races and nations of humanity. Beginning with animals of lower species he is obliged to acknowledge that he finds no traces of commerce among them, and tells but one doubtful story of the possible interchange of values between a bird and a man.

In the lower races he discovers still little which is really commerce. When they give in exchange they appear to think each party makes a true gift to the other, and the mercantile idea is not present. Perhaps here he overlooks a peculiarity of human nature which exists in the highest as well as the lowest civilization. There is, for instance, a sort of pride which while expecting exchange on equal terms declines to recognize it as such. It is illustrated in the American custom of 'treating.'

Leaving this aside, the author pursues his investigations among the negro races of Papua and Africa, discovering in them a strong commercial instinct. In Polynesia he recognizes a widespread commerce, but his chapter on that of Ancient America is very much short of what the reader has a right to expect. The authorities whom he quotes are mostly second-hand, such as Prescott and Bancroft, and he does not seem to be acquainted with the valuable articles of Professor Rau on this topic. Hence we are not surprised to find on page 173 the assertion that the Indians considered commerce of the least possible importance; whereas, every one acquainted with the facts knows that it was one of their most active avocations.

He is more at home when dealing with the early commerce of China, Japan, Egypt and the Arabs, who next occupy his attention. Of their activity in this direction he presents a well written sketch. The classical epochs of Greece and Rome are described in their commercial relations, and from them he passes on to mediæval and modern life, of which he gives a hasty outline. His final chapter is intended to embrace the survey of his results and the forecast of what commerce may be in the future. In this prophetic utterance he indulges in some of those dreams of a possible future society with which he delights to amuse his readers, but for which he acknowledges his hopes are faint.

The work is well printed and has a carefully arranged table of contents and a sufficient index.

D. G. Brinton.

How to Know the Shore Birds (Limicolæ) of North America. By Charles B. Cory. Boston, Little, Brown & Co. 1897. Small 4to. Pp. 89. Price in paper, 75 cents.

How to Know the Ducks, Geese and Swans of North America. By the same author and publisher. Pp. 95. Price in paper, $1.00.

These publications are a departure in the way of ornithological literature. Each consists of a key, with figures of heads, bills and tails, followed by plain descriptions of the species, with additional illustrations and a paragraph or two on the range and eggs. The illustrations are half-tone reproductions of wash drawings by Edward Knobel, and while not equal in artistic merit to those of Fuertes, Ridgway or Thompson are excellent for purposes of identification, and some are admirable as pictures, particularly the one of a group of Labrador ducks. In the case of the shore birds, where the beginner is often confused by strikingly different seasonal plumages, both summer and winter dress are shown; and in the case of the water birds having different sexual plumages, pictures of both male and female are given.

The keys do not conform to the modern